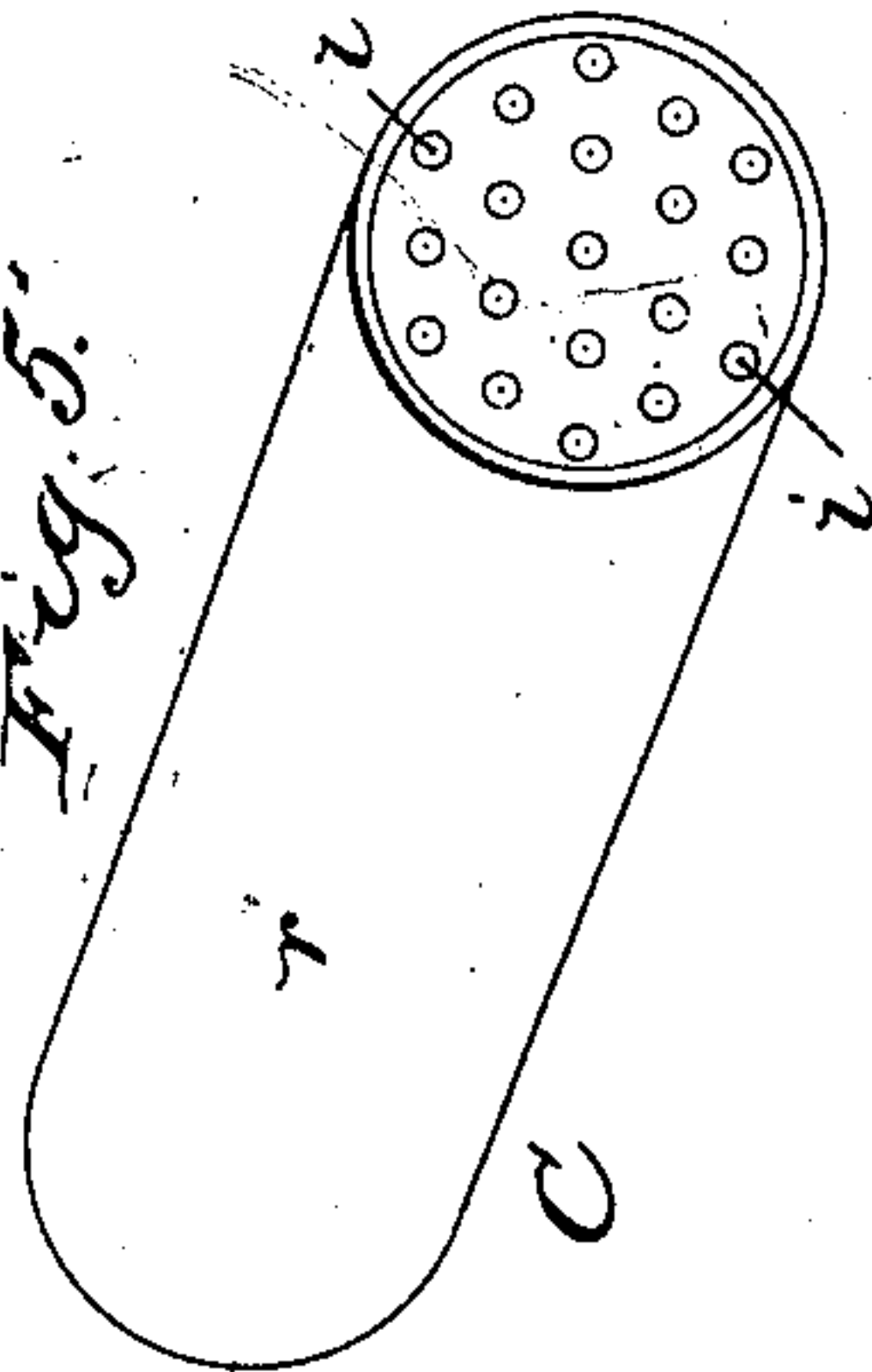
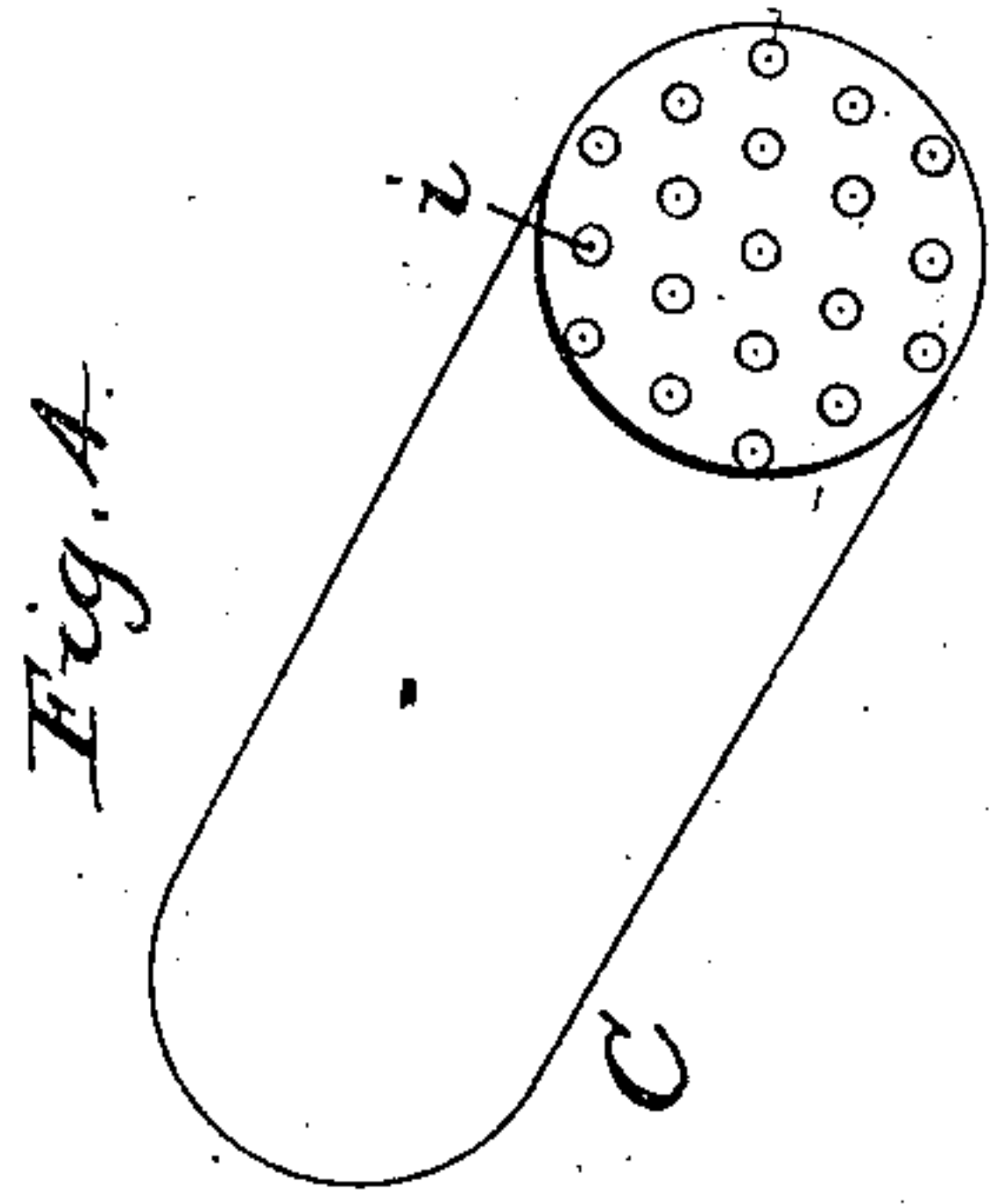
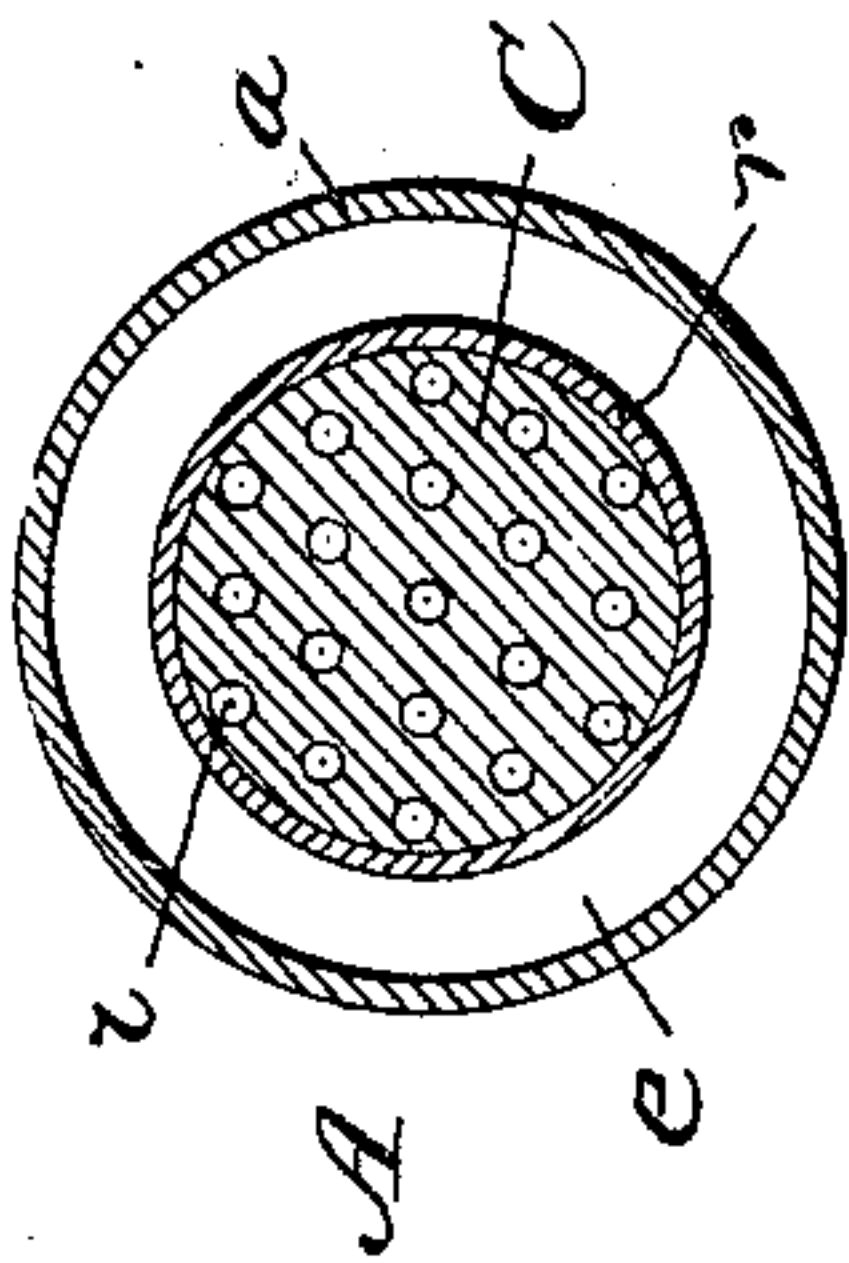
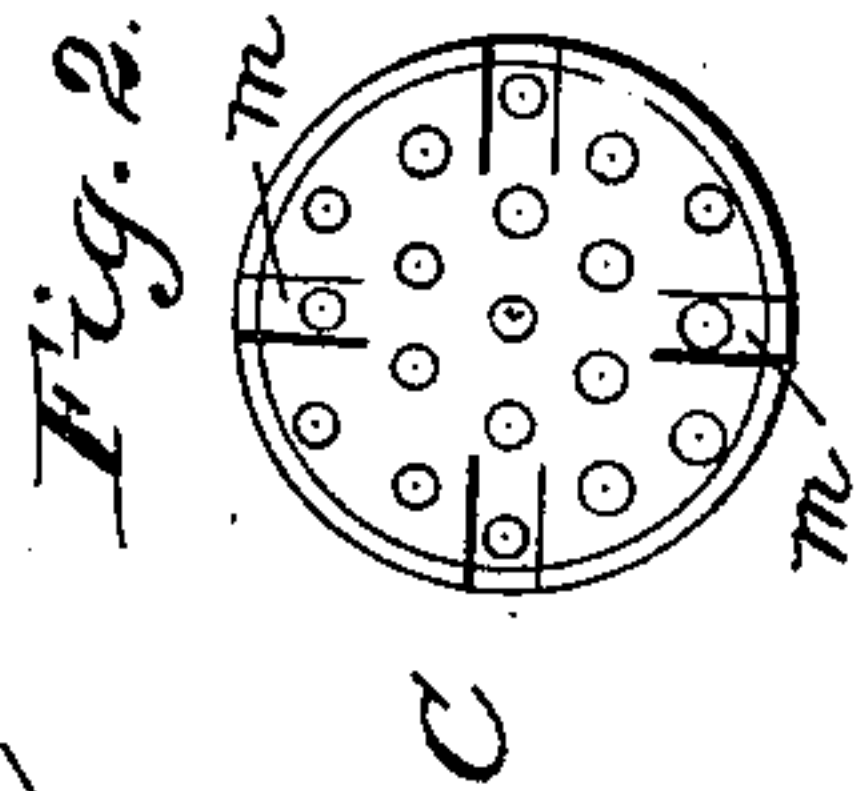
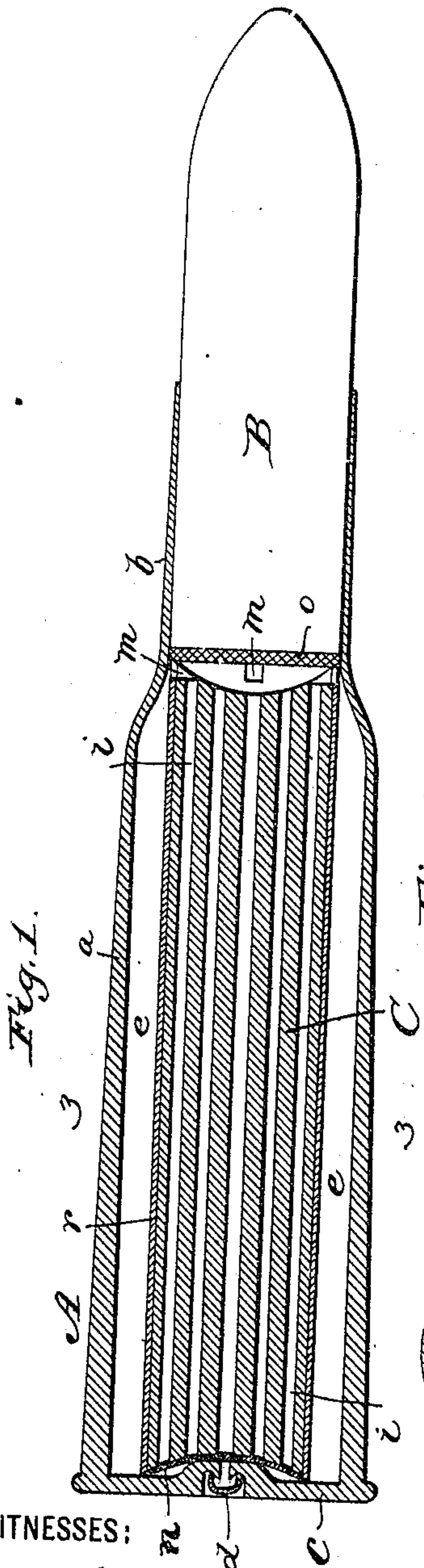


(No Model.)

H. MAXIM.
CARTRIDGE AND CHARGE THEREFOR.

No. 540,326.

Patented June 4, 1895.



WITNESSES:

W. H. Graham.
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BY

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UNITED STATES PATENT OFFICE.

HUDSON MAXIM, OF NEW YORK, N. Y.

CARTRIDGE AND CHARGE THEREFOR.

SPECIFICATION forming part of Letters Patent No. 540,326, dated June 4, 1895.

Application filed December 14, 1893. Serial No. 493,658. (No model.)

To all whom it may concern:

Be it known that I, HUDSON MAXIM, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Cartridges and Charges Therefor, of which the following is a specification.

This invention relates generally to cartridges for small arms or rapid fire guns and more particularly to the powder charges for such cartridges, it being understood, however, that the charges are not necessarily limited to such cartridges.

The improvements contemplate the use of a powder charge of an impervious nature—impervious to the gases of combustion—as distinguished from powder charges which are granular in structure but in a compressed or cake form; such impervious powder, being, for instance, of the character described in my Letters Patent No. 411,127, dated September 17, 1889, which consists of an impervious colloid of pyroxylin made by means of a volatile solvent of the pyroxylin, with or without an admixture of nitro-glycerine, providing an amorphous mass which, while in a plastic condition, is capable of being shaped, molded or pressed to any desired form.

In carrying out my invention, this impervious powder charge is formed preferably in long cylindrical or prismatic rods having a plurality of longitudinal perforations extending from end to end of the rod and which rod of the required diameter may be cut into the proper lengths adapted to the cartridge shell or case with which the charge is to be used; or the rods may be made in the first instance of the proper length for the shell or case. The exterior of the powder charge is incased, covered or coated with an envelope preferably of some combustible material less readily consumed than the powder charge, but which will ultimately be entirely consumed with the latter part of the charge, and after the ball has started, so that no unburned material will remain in the spent shell or in the gun barrel to cause the fouling of it. The powder charge with or without the incasing envelope is such as to form an interior space or chamber between its exterior and the surrounding wall of the cartridge shell or case so that the gases of combustion of the powder

charge may be free to accumulate to some extent before the initial movement of the ball through the gun barrel takes place. The opposite ends of the powder charge may be concaved or cup-shaped, the one end to conform better to the base of the cartridge shell and the pocket for receiving the igniting cap, and between this end of the charge and the igniting cap there is preferably interposed a wafer composed of a suitable fulminating compound and preferably such as is set forth in my pending application, Serial No. 486,978, filed October 2, 1893, and composed of an agglutinated mass of a fulminate and an explosive base, which wafer extending over the ends of the several perforations through the charge will insure the communication of the flame of the igniting cap to the charge throughout the perforations. The opposite end of the perforated powder charge is grooved or channeled transversely to permit the gases of combustion from the several perforations to pass into the chamber surrounding the charge, while the concave at this end of the charge also provides a space for the accumulation of the gases from the several perforations at the rear of the ball or projectile. Any proper wad is interposed between the rear of the ball and the front end of the powder charge.

With this general statement of the improvement a detailed description thereof will now be given, reference being had to the accompanying illustration, containing a practical embodiment of the invention, in which—

Figure 1 is a longitudinal sectional view; Fig. 2, an end view, enlarged, of the front of the powder-charge; and Fig. 3, a cross-section on the line 3 3 of Fig. 1. Figs. 4 and 5 are perspective views showing, respectively, the powder-charge without and with an envelope.

The improvement is illustrated with a cartridge shell or case A of a well known form, having a body portion *a* which, near its forward end, contracts to a neck *b*, that is arranged to receive the ball or projectile B; while the rear end of the shell has a closed head *c* providing a seat for a suitable fulminate cap *d* as is common.

The powder charge C is preferably prepared in the form of a cylindrical or prismatic rod of a diameter that will permit the rod to be readily loaded into the shell through the open

end of the neck *b* and of a length suited to extend from the head *c* of the shell to its contracted or neck portion *b*, such neck affording a support for the charge to hold it in a central position with respect to the larger diameter or body portion *a* of the shell and thus form the surrounding annular chamber *e*. The charge *C* is also formed with a number of longitudinal perforations *i* extending from end to end of the rod or mass and opening outwardly at its opposite ends. The perforations are preferably so disposed through the rod as to leave equal masses of the explosive material surrounding each perforation so that the flame of combustion communicated to the explosive along each of the perforations will gradually consume the mass and by the time the perforations have become so much enlarged as to meet, practically the entire mass will have been consumed; and in this manner the area of explosive along each perforation exposed to the flame of combustion has gradually increased so that an accelerating propulsive action upon the projectile is insured.

The rear end and preferably also the front end of the charge is concaved or cup shaped as shown in Fig. 1, the rear end being thus adapted to better fit over the inwardly projecting seat portion of the head *c* for receiving the fulminate cap as before described, which formation serves with the neck *b* as a means for holding the charge *C* in a fixed central position within the shell.

The forward concaved end of the charge is provided with transverse channels *m* which serve to connect the front end of the several perforations with the chamber *e* surrounding the charge and thus permit a free escape of the gases of combustion from the perforations in the concaved front end into said chamber.

Between the rear end of the charge *C* and the head *c* of the shell there is preferably interposed a disk or wafer *n* of a fulminating compound such as that before referred to, which disk or wafer overlies the rear ends of the perforations through the mass and is adapted to insure the communication of the igniting flame of the fulminate cap *d* to the surface of the explosive at each of the perforations and thus provide for the simultaneous combustion of the charge along each perforation.

The front end of the charge *C* has a wad *o* inserted between it and the projectile *B*.

In order to prevent the flame of the initial combustion of the charge or of the fulminate *d* or of the wafer *n* from communicating to the exterior of the cylindrical charge *C*, such exterior is in the preferred form incased, coated or protected by an envelope *r* of some combustible material which will ultimately be wholly consumed by the heat of the gases of combustion accumulated in the chamber *e*, but which will be less readily burned than the explosive forming the charge itself. This

combustible envelope *r* may be celluloid or other suitable material or substance, which may be applied to the exterior of the charge in any proper manner according to the nature of the coating. The envelope *r*, also, will be such that its combustion will take place after the ball or projectile *B* has started in its movement along the gun barrel and thus will have aided in preventing the too rapid disintegration of the charge *C* and its entire collapse under the pressure of the gases of combustion before the ball has fairly started in its movement.

The surrounding annular chamber *e* in which the gases of combustion readily accumulate affords means by which the accumulated gases on the exterior of the charge may counteract the disrupting effect of the gases within the perforations and thus the charge is prevented from breaking down and falling to pieces too rapidly and thereby tend to vary the accelerating action of the otherwise gradually increasing formation of the propulsive gases.

It will be observed that an important feature of this invention is the provision of a powder charge in the form of a single solid and impervious piece which is non-friable and tough and may be transported and handled independently of their case without liability of breaking or injury as is the case with a granular cake, and which may be introduced into the shell without involving in the loading operation any measuring of the amount of the explosive, the predetermined size of the said solid piece being the measure of the strength of the charge; neither is any ramming or solidification of the explosive charge rendered necessary as a part of the loading operation. Loaded cartridges may also, when provided with my improved explosive charge be readily dismantled, the said charges being capable of being individually removed from their shells and handled without inconvenience or waste.

What is claimed is—

1. A cartridge shell having a contained perforated explosive charge providing a chamber within the shell surrounding said charge and with which the perforation or perforations communicate, as set forth.

2. A cartridge shell having a contained longitudinally perforated explosive charge protected on its exterior by an envelope and providing a chamber within the shell surrounding said charge and with which the perforations communicate, as set forth.

3. An explosive mass in cylindrical rod form and perforated longitudinally having a concaved front end forming a chamber with which the perforation or perforations communicate, as set forth.

4. A cartridge shell having a contracted neck and a fulminate cap pocket, and a contained explosive charge in rod form adapted to said contracted neck and having a con-

caved rear end to overlie or fit over the pocket whereby the charge is supported in fixed position within the shell, as set forth.

5. An explosive mass in rod form and perforated longitudinally having a concaved frontend and transverse channels at said end, as set forth.

10 6. A cartridge shell having a contained explosive charge perforated longitudinally, an igniting means and an igniting disk interposed between said means and the perforated end of the charge, as set forth.

7. A cartridge comprising a shell, a projectile, and an explosive charge in said shell consisting of a solid longitudinally perforated piece of less diameter than the interior diameter of the shell, as set forth. 15

In witness whereof I have hereunto signed my name in the presence of two witnesses.

HUDSON MAXIM.

Witnesses:

E. L. TODD,

H. N. LOW.